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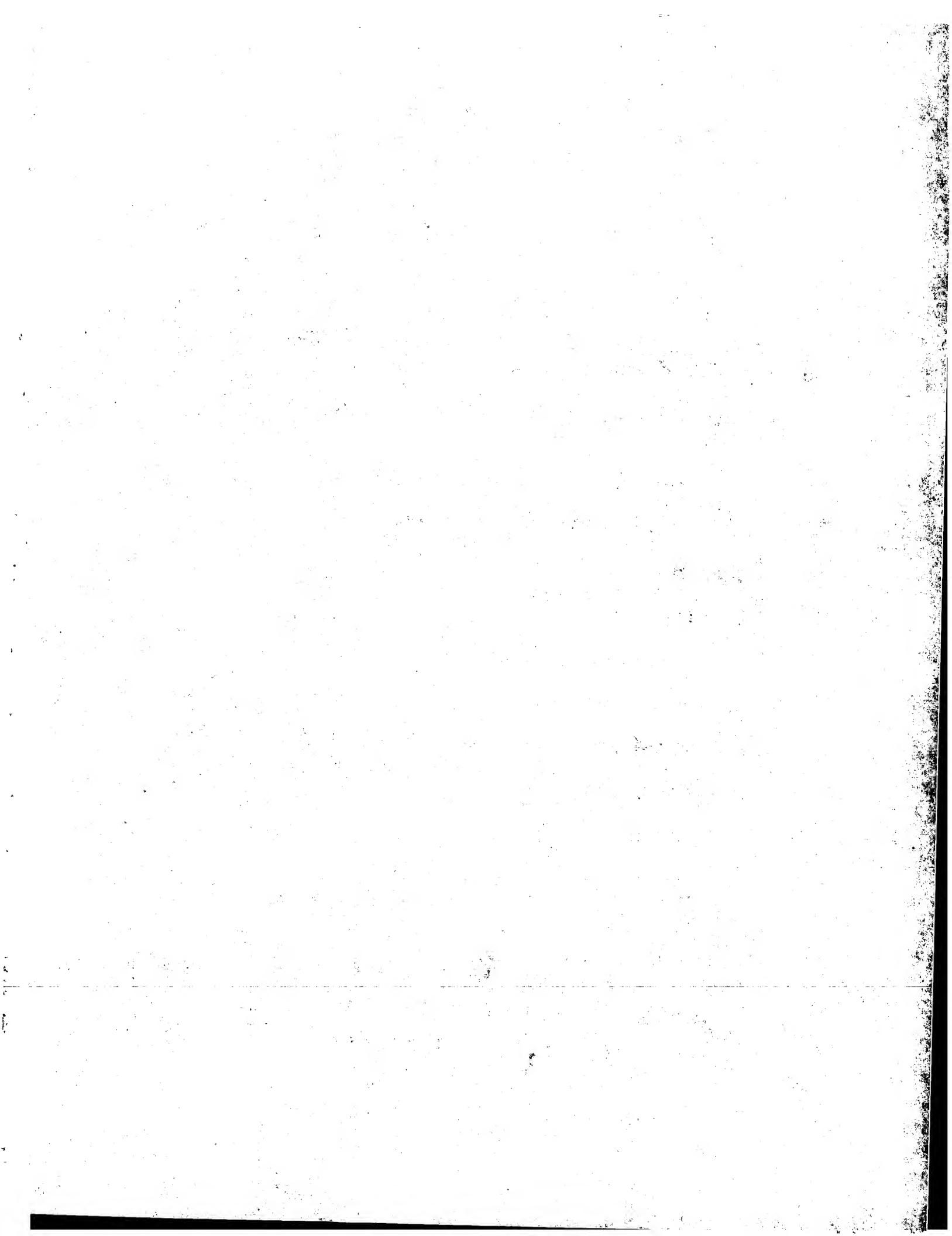
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E1C C36B

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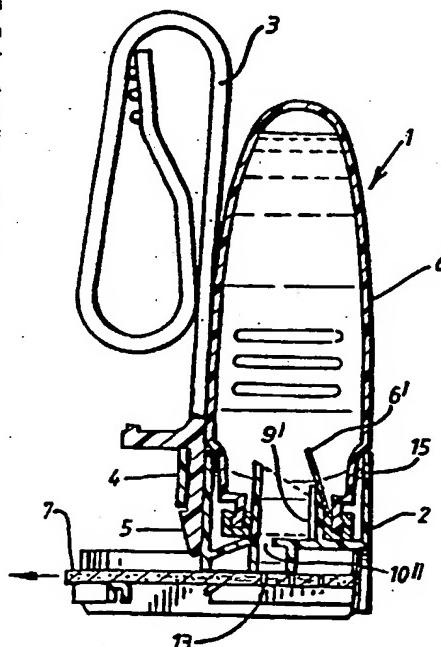
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(54) Abstract Title

Dispensing liquids

(57) A liquid dispenser 1 comprises a housing 2 and a hook 3 for suspending the housing 2 from the rim of a lavatory bowl. A user inserts a sealed inverted reservoir bottle 6 into the housing 2, which breaks the seal. A porous pad 7 located in the housing 2 conveys liquid from the bottle 6 to a position within the stream of flushing water.

The housing includes an inlet portion provided with a projection in the form of a stud 9' which serves to retain the cap 6' in its open position. The stud 9' is formed integrally with the inlet portion 9. The extreme end of the inlet portion 9 bears against one side of the cap 6' of the reservoir bottle 6, causing it to break and to pivot about an axis at the opposite side. On fully inserting the inlet portion 9 into the reservoir bottle 6, the stud 9' is caused to bear against the outer face of the cap 6' so as to prevent it from falling back into its closed position. The stud 9' extends along the complete length of the cylindrical inlet portion 9, for ease of manufacturing, e.g. by moulding.



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FIG. 1

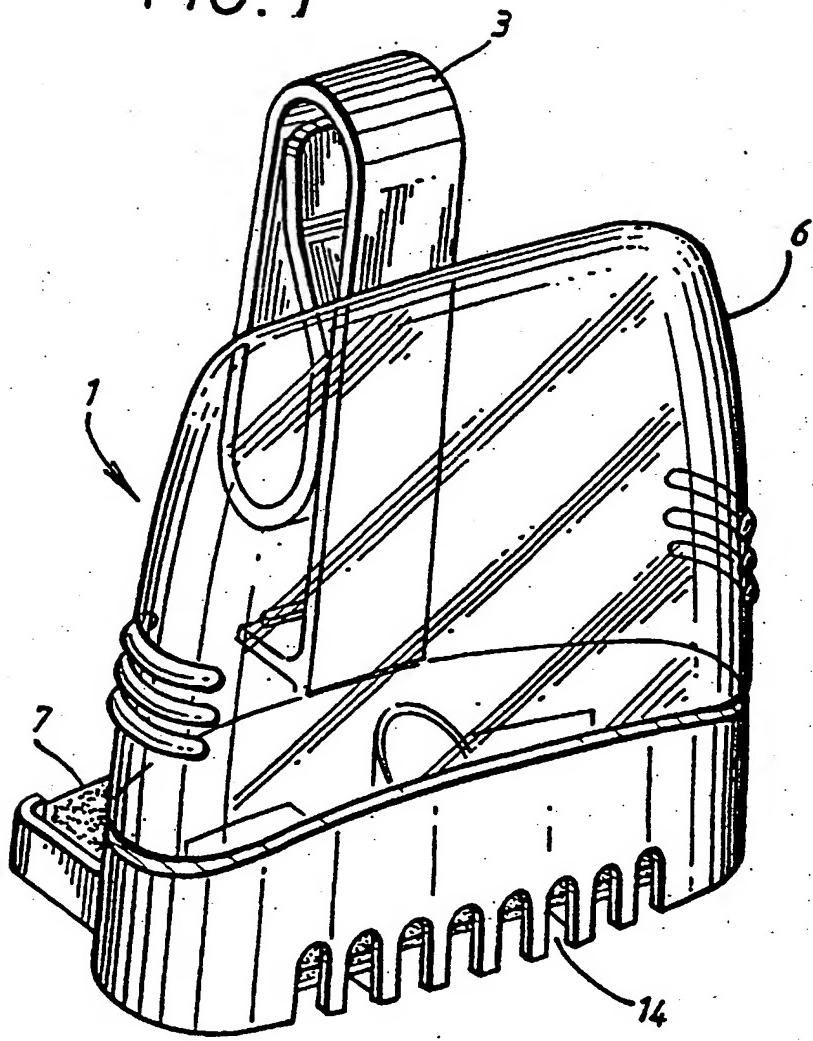
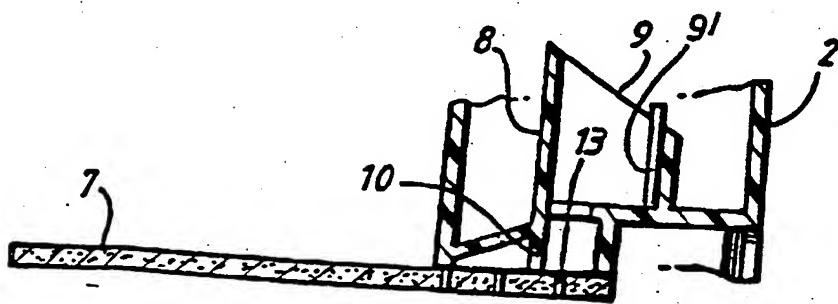
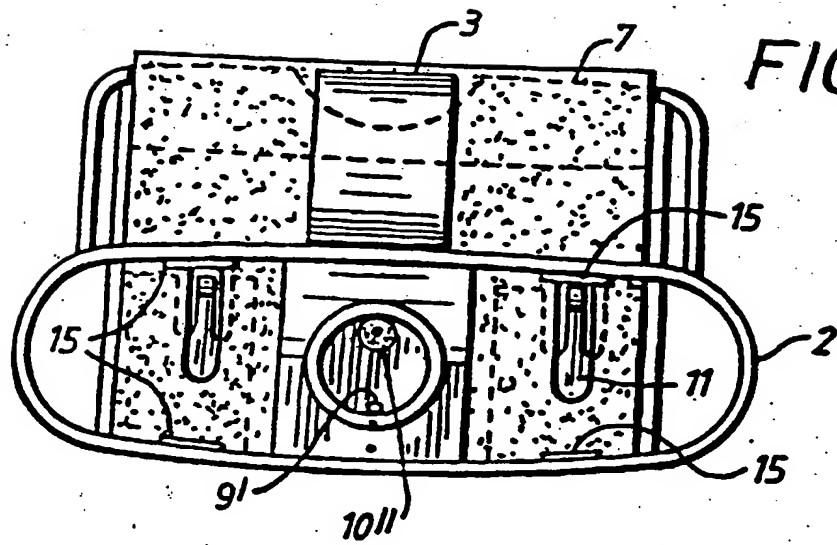
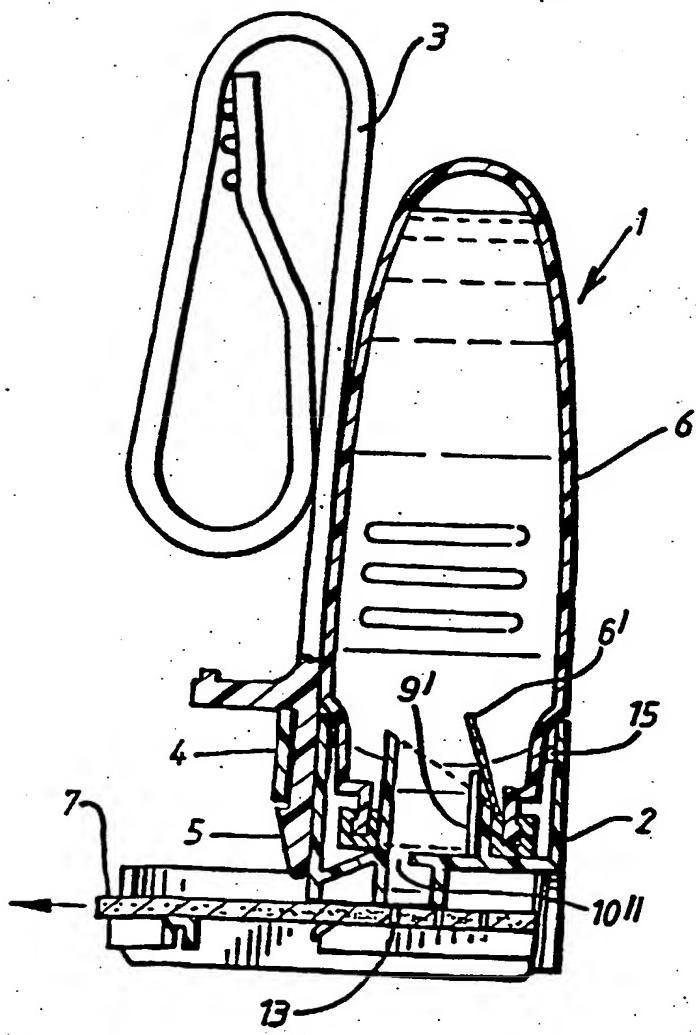


FIG. 3



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FIG. 4(a)

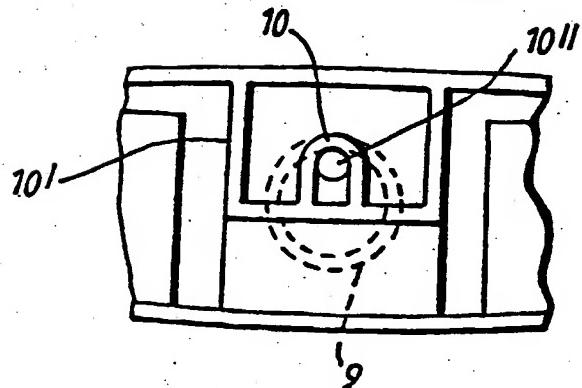


FIG. 4(b)

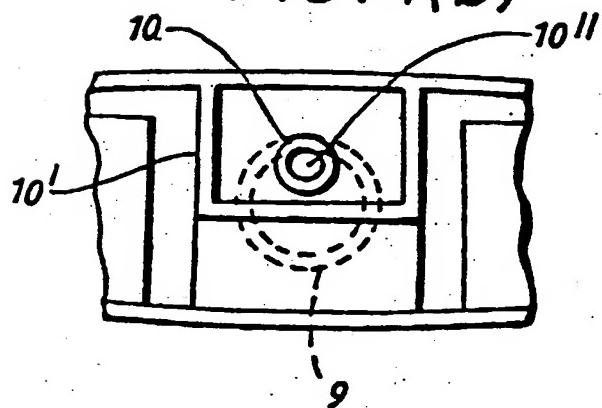


FIG. 4(c)

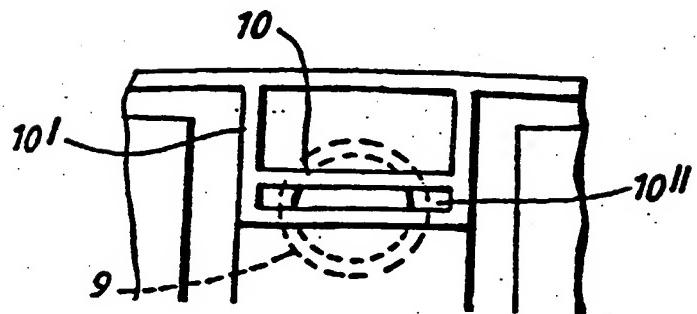


FIG. 5

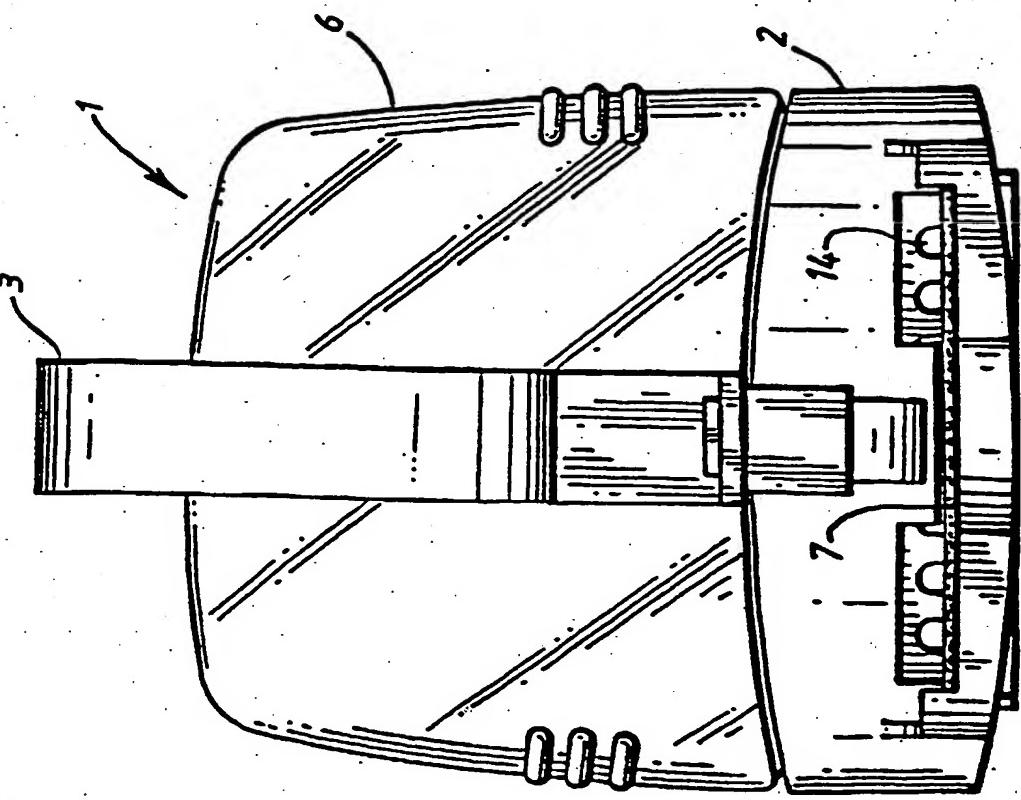
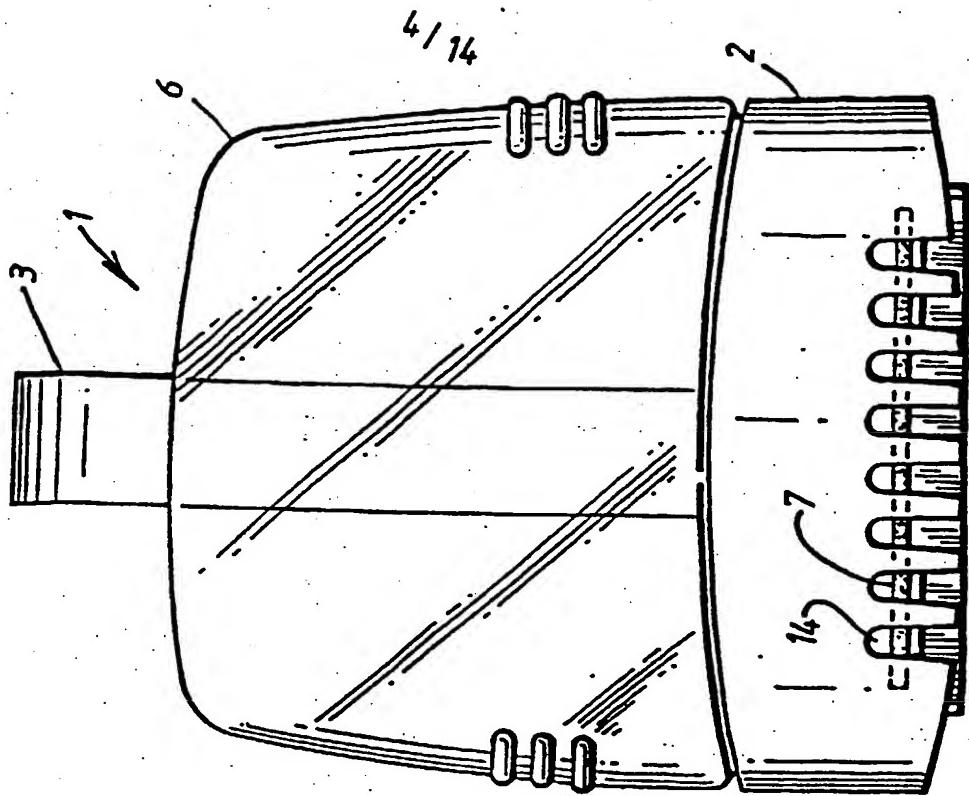


FIG. 6



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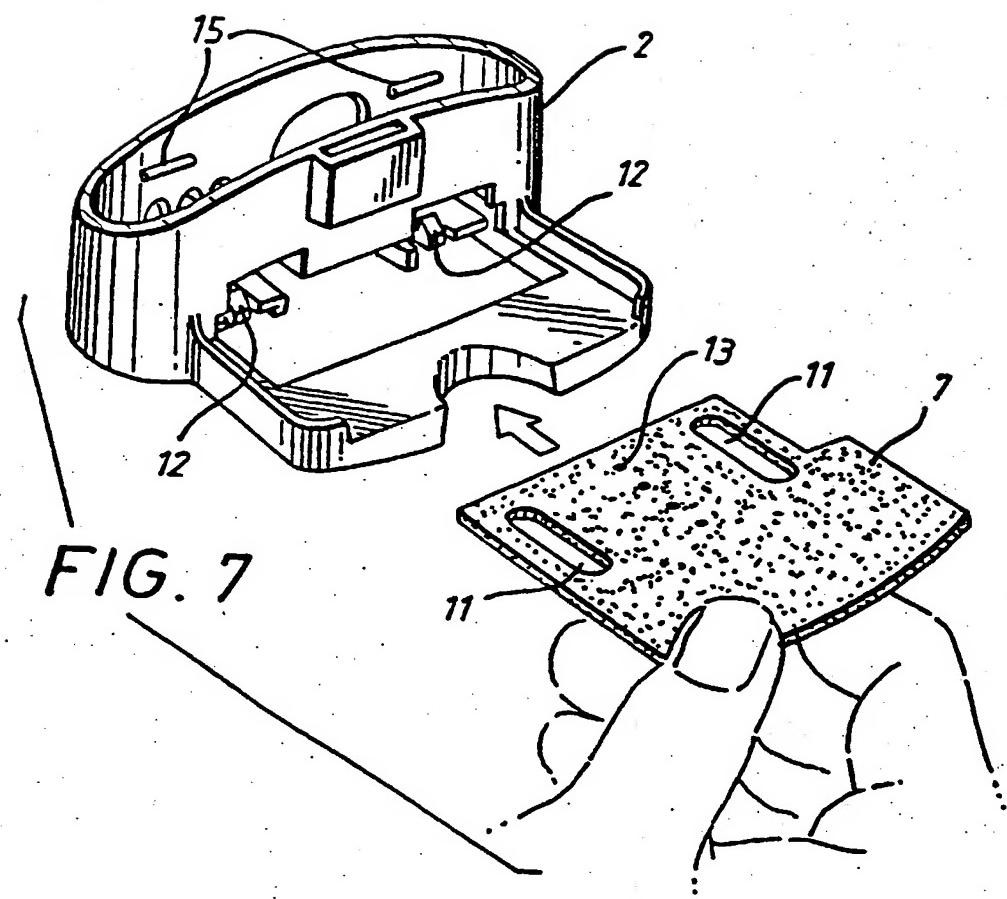
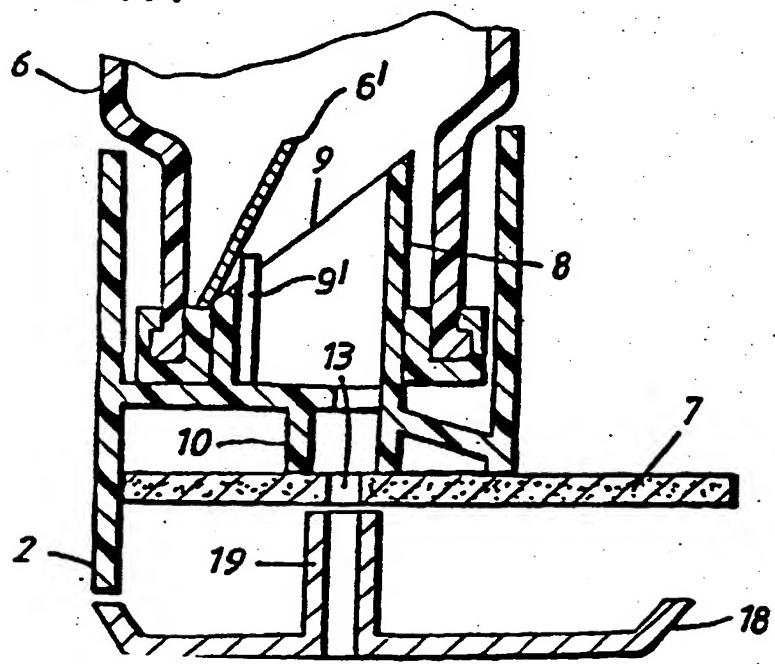


FIG. 11



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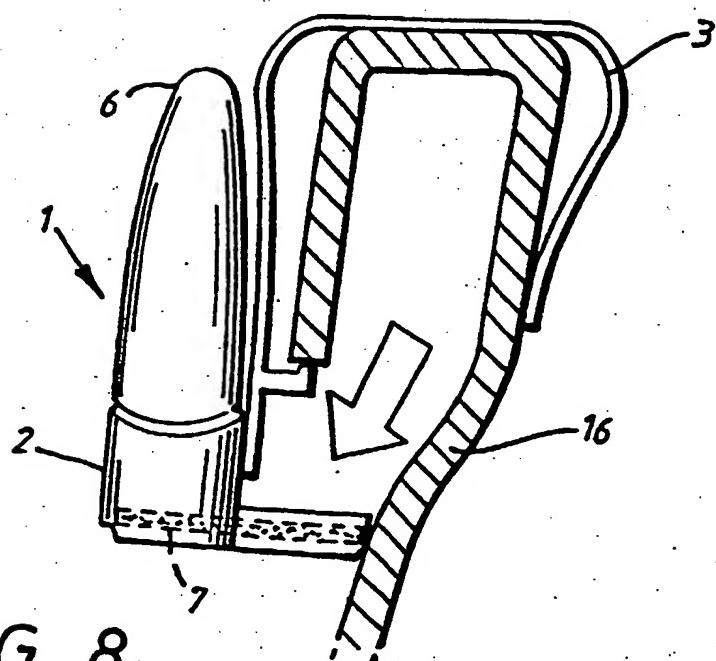


FIG. 8

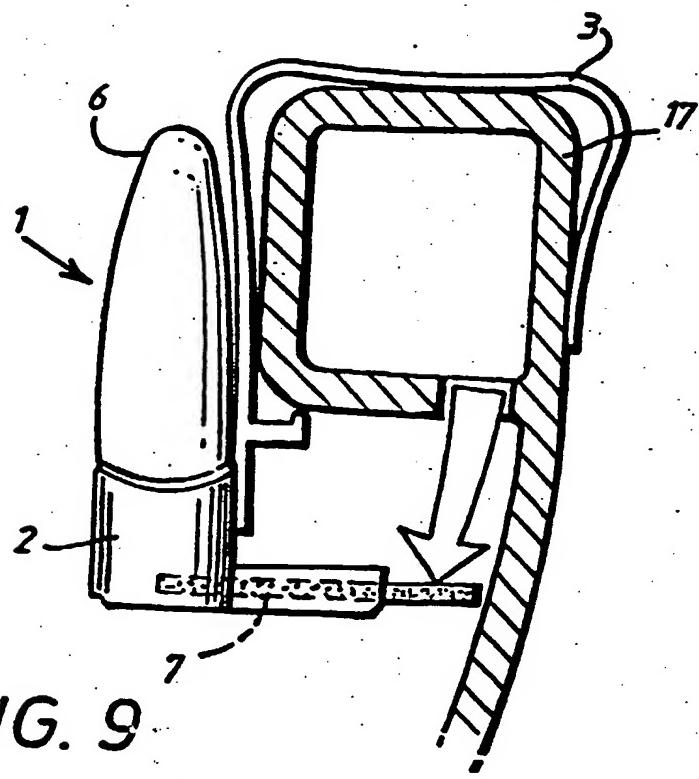
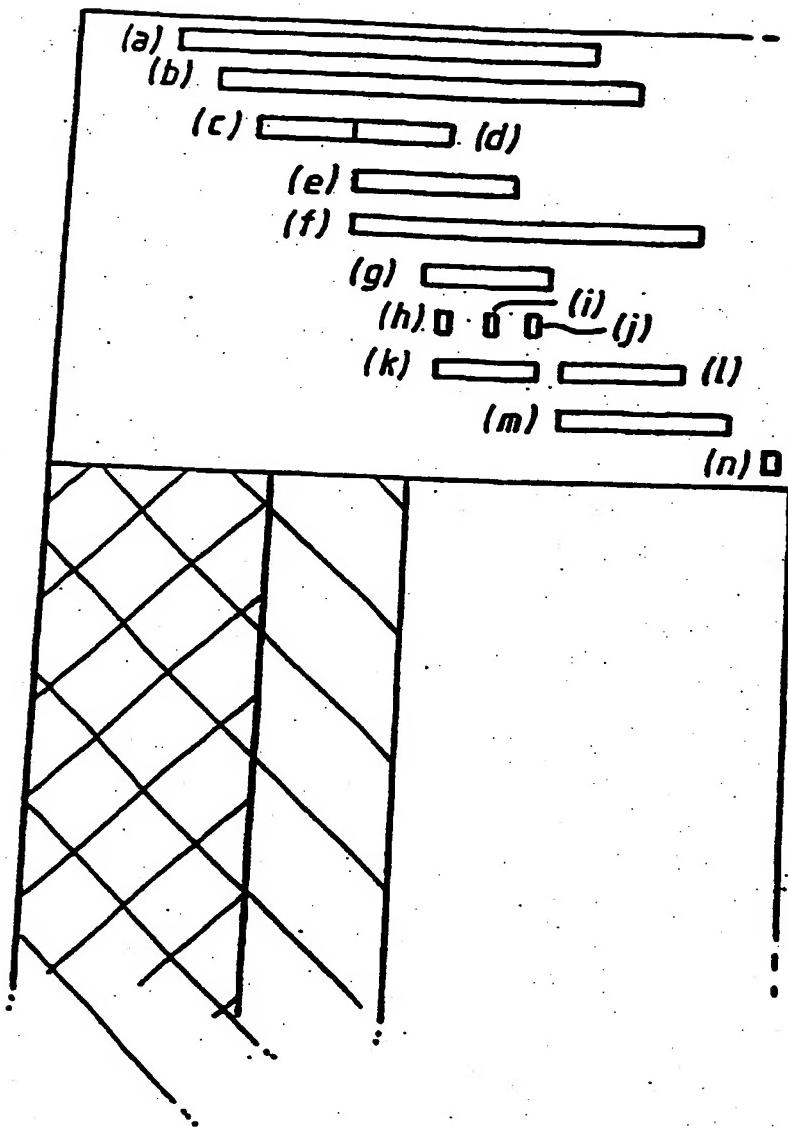


FIG. 9

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FIG. 10



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FIG. 12(a)

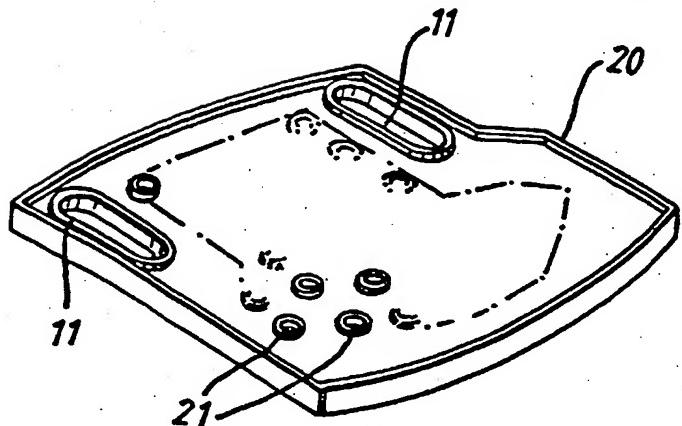


FIG. 12(b)

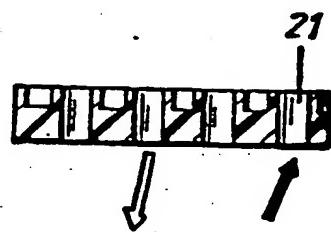


FIG. 13(a)

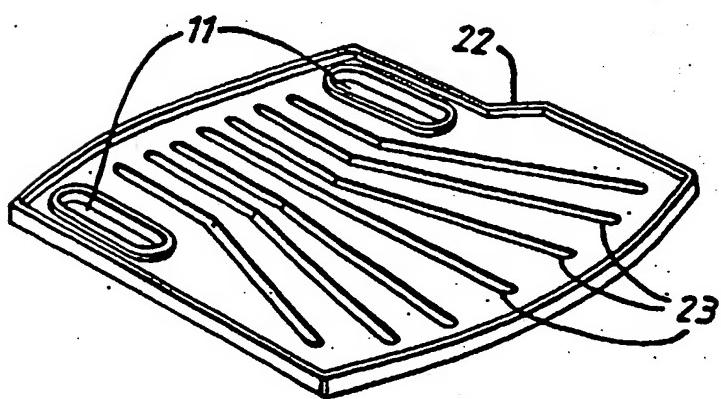
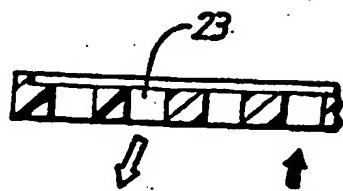
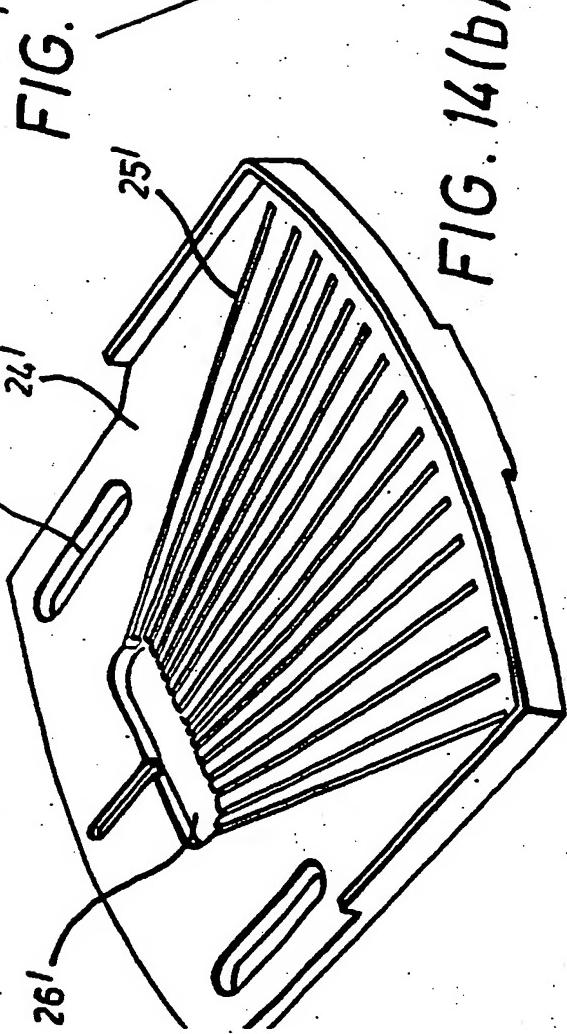
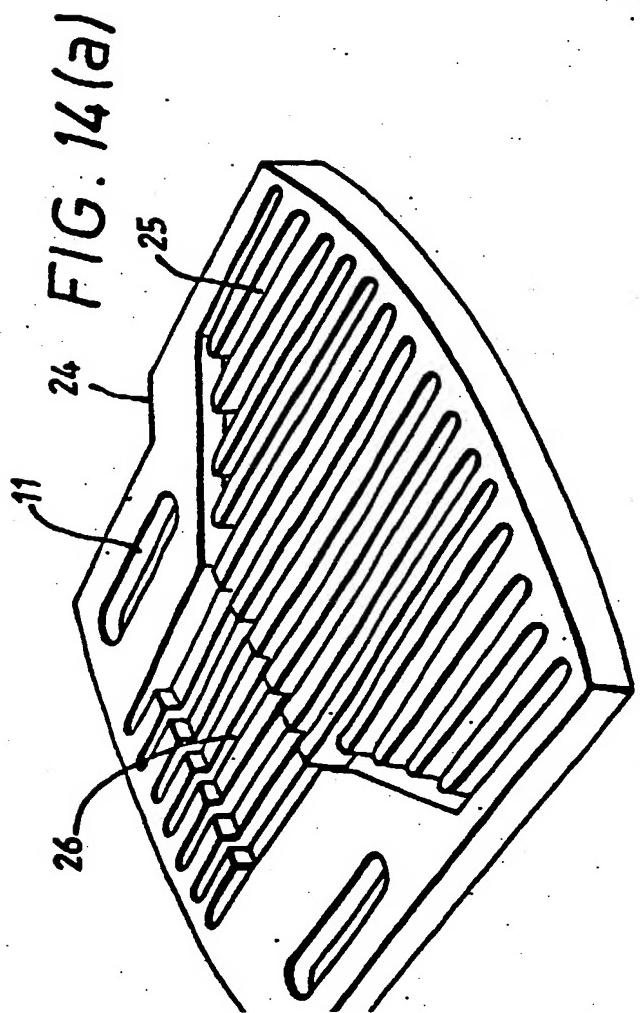
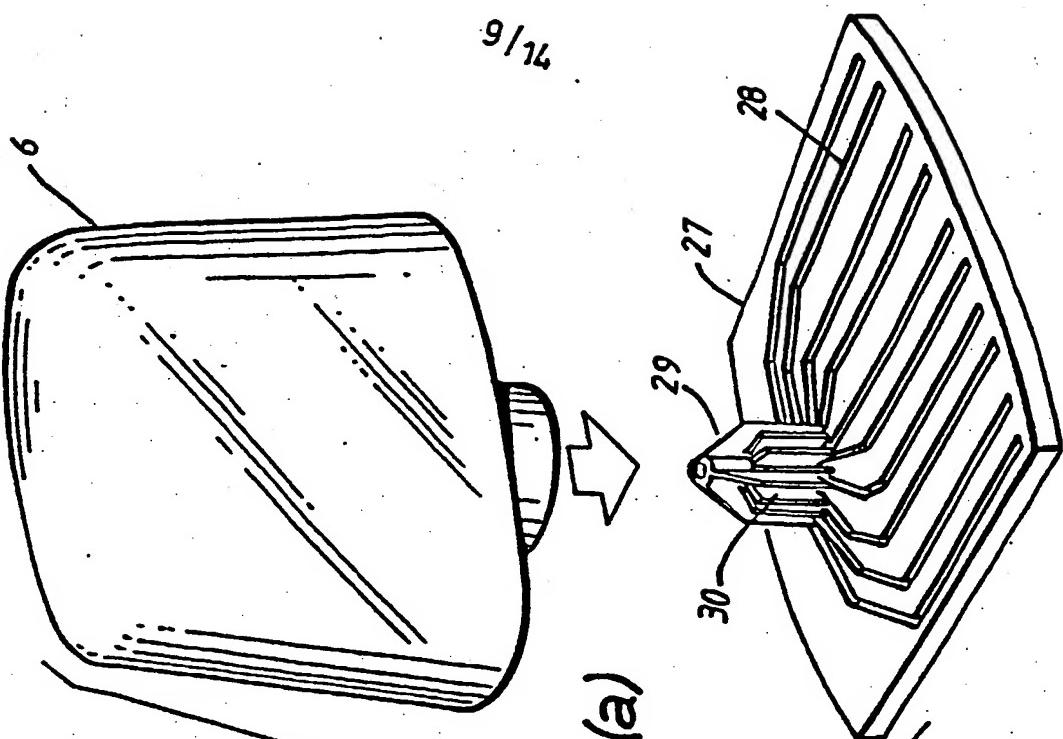


FIG. 13(b)





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FIG. 15(b)

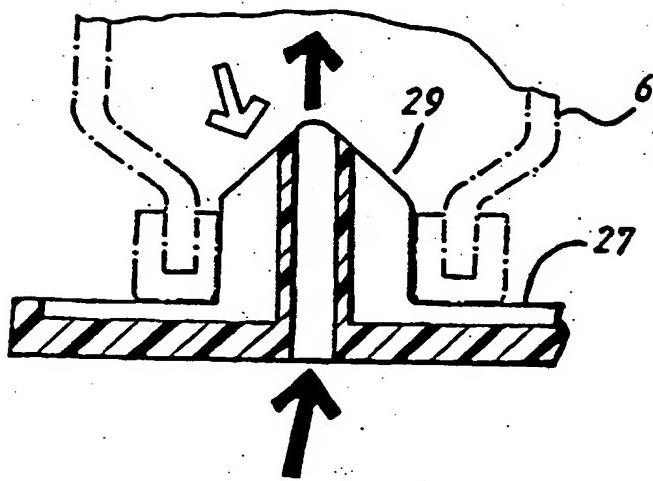


FIG. 16(a)

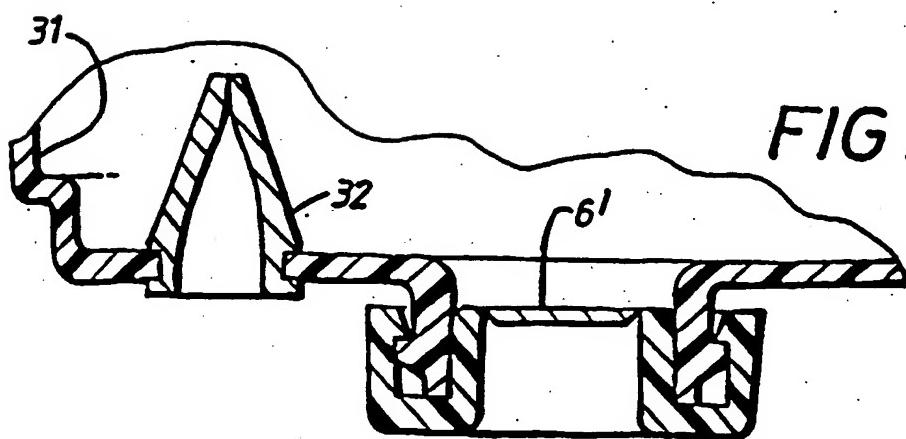
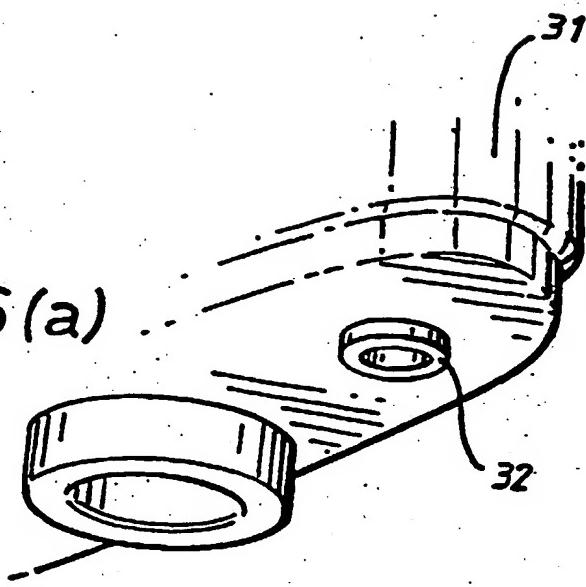


FIG. 16(b)

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FIG. 17(a)

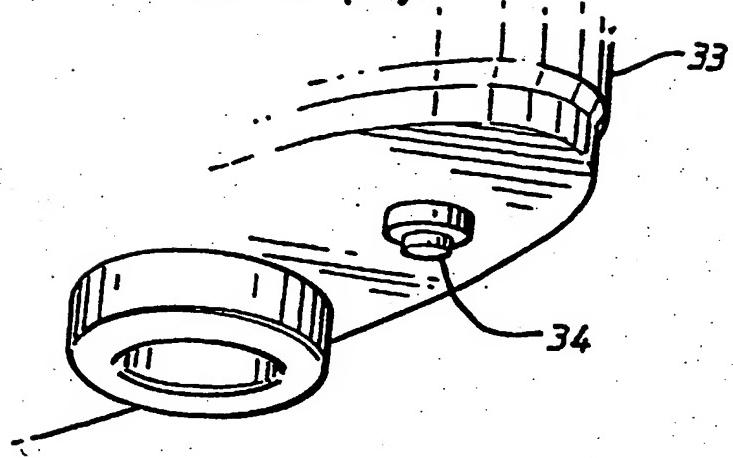


FIG. 17(b)

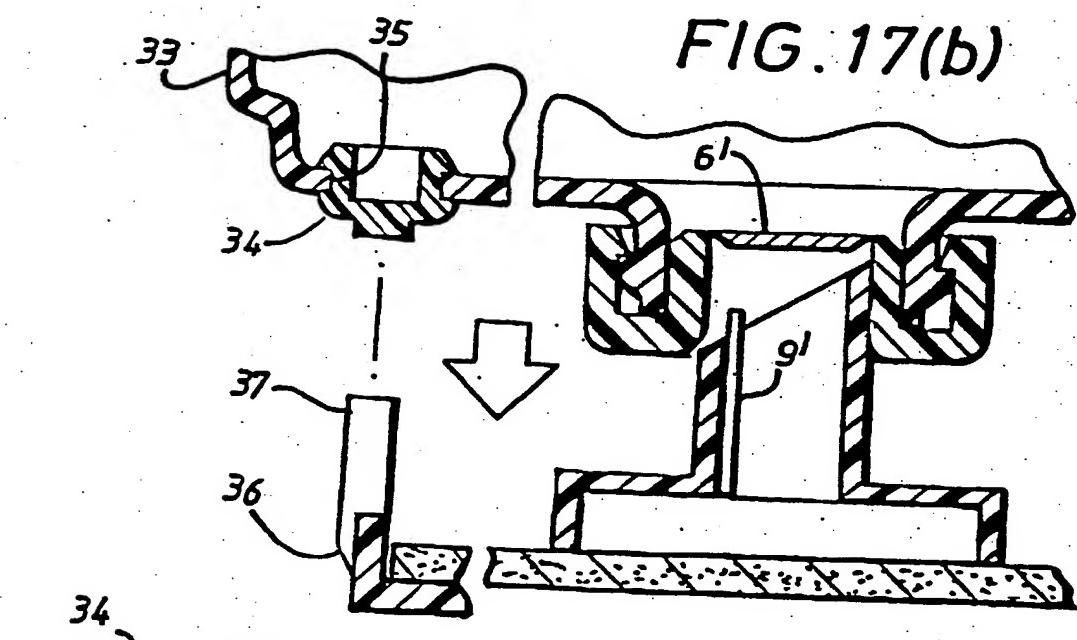
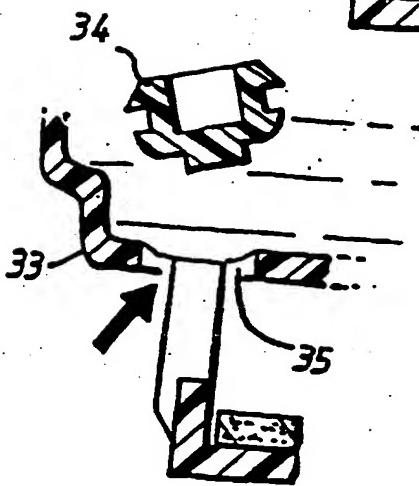


FIG. 17(c)



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FIG. 18(a)

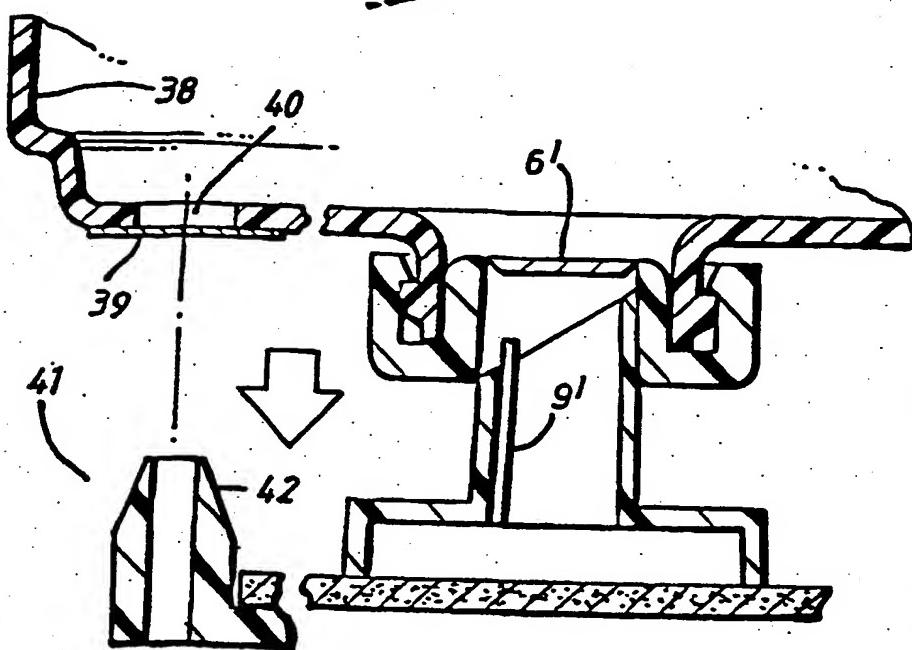
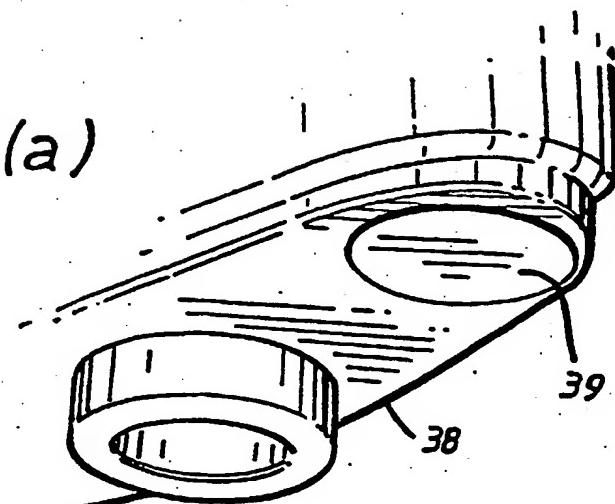


FIG. 18(b)

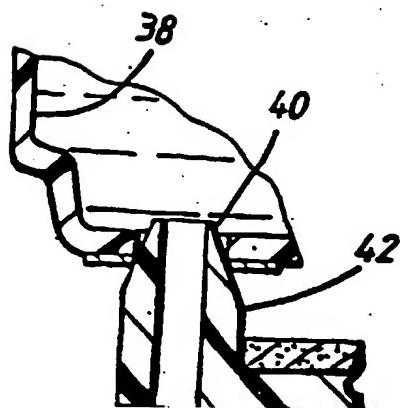


FIG. 18(c)

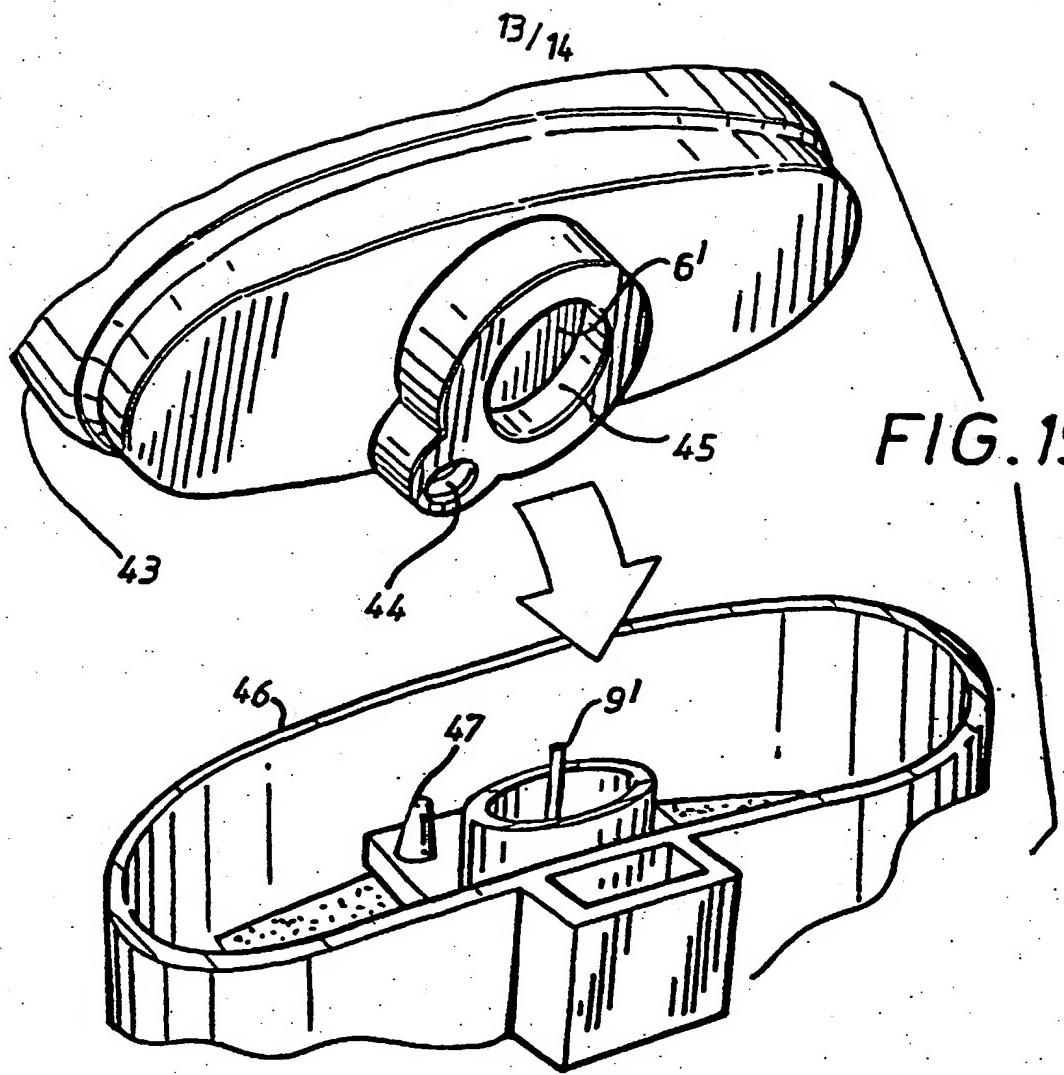
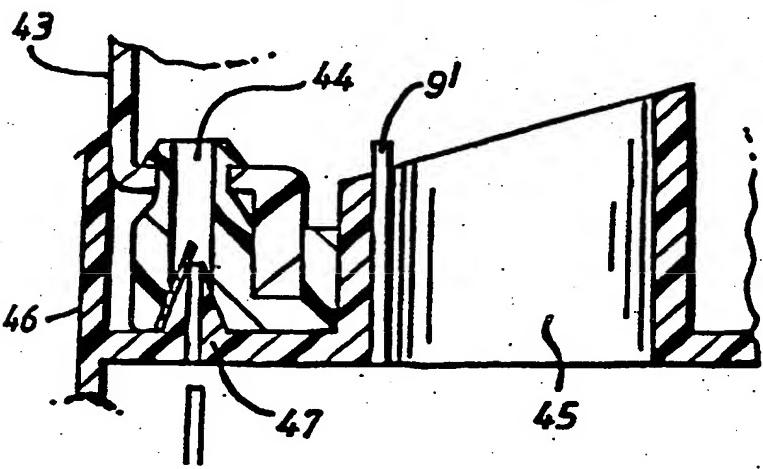


FIG. 19(b)



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FIG. 20(a)

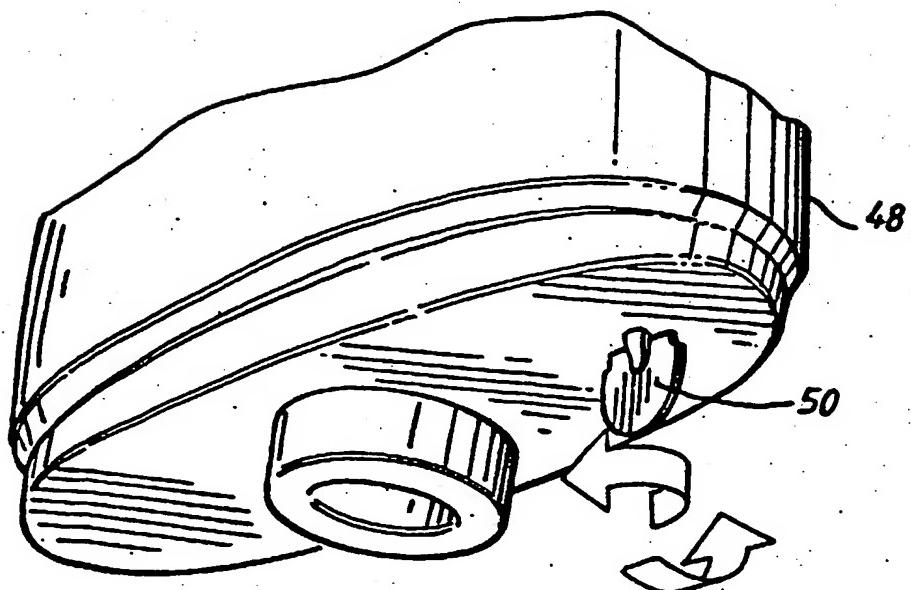


FIG. 20(b)

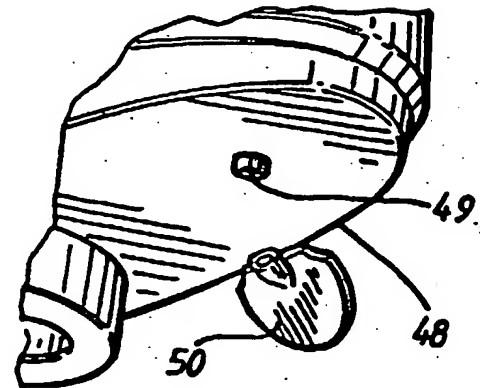
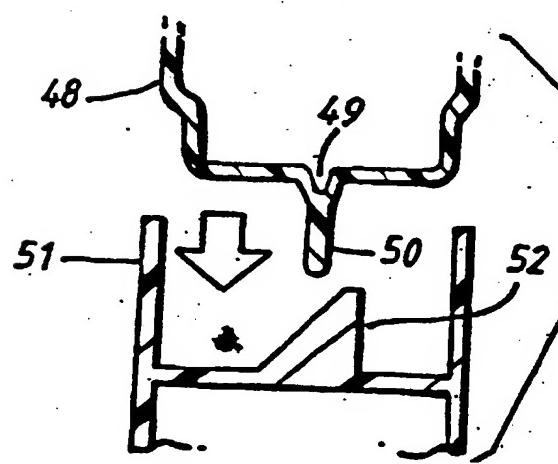


FIG. 20(c)



DISPENSING LIQUIDS

The present invention relates to liquid dispensers and in particular to arrangements for dispensing quantities of liquids, such as cleaning and/or refreshing liquids, from the rim 5 of a lavatory bowl. Such dispensers typically comprise a reservoir in the form of an inverted bottle, which supplies the liquid to a wicking device, such as a porous pad.

One known device of this type is described in published European patent application EP-A-0 785 315. This application acknowledges the problem with such devices that as 10 the liquid level in the bottle falls the rate at which liquid is dispensed falls with time and thereby renders the dispenser less effective.

The solution to this problem suggested by the above reference is to provide a structure between the mouth of the bottle and the wicking device so as to permit both the flow of 15 the liquid from the bottle to the wicking device and also a return flow of air from outside the dispenser to the bottle.

However, the proposed structure is complex and therefore expensive to manufacture. Furthermore, a given dispenser of the type described in this reference can function only 20 with a lavatory system having a predefined relative position of the rim of the lavatory bowl and the stream of flushing water.

It would therefore be desirable to provide liquid dispensers which overcome, or at least mitigate, one or more of the above disadvantages of the prior-art dispenser.

25

In accordance with the present invention there is provided a liquid-dispensing device comprising a liquid reservoir having a mouth and a closure member arranged, when in its closed position, to seal the mouth and which can be moved into an open position, in which liquid can be dispensed from the reservoir, the device further comprising opening 30 means for causing the closure member to be so moved into said open position and means for retaining said closure member in its open position.

Such an arrangement enables liquid to be dispensed from the reservoir, once opened, while preventing the closure from returning to its closed position, e.g. by the weight of the liquid remaining in the reservoir in the case of an inverted reservoir.

- 5 The closure member is preferably substantially rigid and arranged to be pivoted between said open and closed positions about one side thereof. The angle through which the closure member is moved between said open and closed positions may be substantially 90 degrees. This reduces the force exerted by the weight of the liquid remaining in the reservoir on the closure member, in the case of an inverted reservoir.

10

The opening means preferably comprises a projection arranged to bear on the side of the closure member generally opposite to said one side, and the retaining means preferably comprises a further projection arranged to bear on a face of the closure member when in its open position.

15

The closure member may be substantially circular, and the opening means and the retaining means are then preferably disposed at diametrically opposed positions in relation to the closure member.

- 20 The opening means and the retaining means are preferably formed on a substantially circular obliquely truncated cylinder which is arranged to be inserted into the mouth of the reservoir to cause the closure member thereof to move into its open position. In this case, the opening means preferably comprises the end portion of the obliquely truncated cylinder, and the retaining means comprises a projection from the cylinder in the form
25 of a stud.

The cylinder and the reservoir mouth are preferably so dimensioned as to form a substantially liquid-tight seal when the cylinder is inserted in the reservoir mouth.

- 30 The opening means and the retaining means conveniently form part of a housing for the reservoir, and housing may comprise means for suspending the device such that, when the opening means and the retaining means are inserted in the reservoir mouth, the reservoir is supported in an inverted position with the mouth lowermost, such that the

liquid can be dispensed from the reservoir. For example, the device may be arranged to be suspended from the rim of a lavatory, and the liquid may be a cleansing and/or refreshing liquid.

- 5 The invention further extends to a housing for a liquid reservoir having a mouth and a closure member arranged, when in its closed position, to seal the mouth and which can be moved into an open position, in which liquid can be dispensed from the reservoir, said housing comprising opening means for causing the closure member to be so moved into said open position and means for retaining said closure member in its open position.
- 10

Preferred embodiments of the invention will now be described with reference to the accompanying drawings, in which:

- 15 Figure 1 is a perspective view of a liquid dispenser in accordance with a preferred embodiment of the present invention;

Figure 2 is a cross-sectional view of the embodiment shown in Figure 1;

- 20 Figure 3 is a detail of the cross-sectional view of Figure 2 in a different configuration and without the reservoir bottle;

Figure 4 is a plan view of the embodiment shown in Figures 1 to 3 but without the reservoir bottle;

25

Figures 4(a) to (c) illustrate plan views from underneath of three different structures of the outlet portion;

Figure 5 is a front view of the liquid dispenser of Figures 1 to 4;

30

Figure 6 is a rear view of the liquid dispenser of Figure 1 to 5;

Figure 7 illustrates schematically the manner in which a porous pad may be inserted into the housing of a liquid dispenser of the preferred embodiment;

5 Figure 8 illustrates schematically the relative position of the dispensing device of the preferred embodiment and a lavatory rim from which the device is suspended;

10 Figure 9 illustrates schematically the relative position of the dispensing device of the preferred embodiment in another configuration and a different lavatory rim from which the device is suspended;

Figure 10 is a chart illustrating different types of lavatory flushing arrangements;

15 Figure 11 illustrates an optional arrangement of a spillage tray and vent channel for use with the preferred embodiment;

Figure 12(a) illustrates a first alternative structure for the wicking device of the liquid dispenser shown in Figures 1 to 10;

20 Figure 12(b) is a cross-sectional view of the wicking device shown in Figure 12(a);

Figure 13(a) illustrates a second alternative structure for the wicking device of the liquid dispenser shown in Figures 1 to 10;

25 Figure 13(b) is a cross-sectional view of the wicking device shown in Figure 13(a);

30 Figures 14(a) and (b) illustrate respectively third and fourth alternative structures for the wicking device of the liquid dispenser shown in Figures 1 to 10;

Figure 15(a) is a perspective view of a fifth alternative structure for the wicking device in combination with the reservoir bottle of the liquid dispenser shown in Figures 1 to 10;

Figure 15(b) is a cross-sectional view of the wicking device and reservoir bottle shown in Figure 15(a);

5 Figure 16(a) is a perspective view of a first alternative venting arrangement for the liquid dispenser shown in Figures 1 to 10;

Figure 16(b) is a cross-sectional view of the venting arrangement shown in Figure 16(a);

10

Figure 17(a) is a perspective view of a second alternative venting arrangement for the liquid dispenser shown in Figures 1 to 10;

15 Figure 17(b) is a cross-sectional view of the venting arrangement shown in Figure 17(a);

Figure 17(c) is a portion of the cross-sectional view of Figure 17(b) illustrating the release of the venting plug;

20 Figure 18(a) is a perspective view of a third alternative venting arrangement for the liquid dispenser shown in Figures 1 to 10;

Figure 18(b) is a cross-sectional view of the venting arrangement shown in Figure 18(a);

25

Figure 18(c) is a portion of the cross-sectional view of Figure 18(b) illustrating the breaking of the venting seal;

30 Figure 19(a) is a perspective view of the top of the reservoir bottle and the housing in a fourth alternative venting arrangement for the liquid dispenser shown in Figures 1 to 10;

Figure 19(b) is a cross-sectional view of the venting arrangement shown in Figure 19(a) after insertion of the reservoir bottle in the housing;

5 Figure 20(a) is perspective view of a fifth venting arrangement for the liquid dispenser shown in Figures 1 to 10;

Figure 20(b) is a perspective view of a portion of the reservoir bottle shown in Figure 20(a) showing the cover plate broken away to expose the vent hole; and

10 Figure 20(c) is a cross-sectional view of a sixth venting arrangement, similar to that shown in Figures 20(a) and 20(b) but wherein the cover plate is broken away automatically by a projection on the housing of the liquid dispenser on insertion of the reservoir bottle into the housing.

15 With reference to Figures 1 to 7, a liquid dispenser 1 comprises a housing 2 and a sprung suspension hook 3 for suspending the housing 2 from the rim of a lavatory bowl (not shown). For ease of manufacture, the suspension hook 3 is formed as a separate component from the housing 2, and the housing 2 is formed with an integral guide channel 4 (see Figure 2) of rectangular cross-section into which the lower end of the 20 suspension hook 3 is inserted during manufacture. The lower end of the suspension hook 3 comprises a raised, chamfered portion 5, such that, upon insertion, the hook 3 remains engaged within the channel 4 by a snap-fitting arrangement.

Once the unit is thus suspended, a user inserts in the housing 2 a sealed inverted 25 reservoir bottle 6 into the housing 2. The act of insertion causes the seal on the reservoir bottle 6 to break, in a manner to be described below. A wicking device in the form of a porous pad 7 is located in a slot within the housing 2, and this pad conveys liquid from the reservoir bottle 6 to a position within the stream of flushing water within the lavatory by capillary action.

30 The housing 2 includes a conduit 8 for conveying the liquid from the reservoir bottle 6 to the porous pad 7. The conduit 8 comprises an inlet portion 9 of circular cross-section which is sized so as to fit snugly within the circular mouth of the reservoir bottle 6. The

inlet portion 9 terminates obliquely, as seen clearly in Figures 2 and 3, so as to form an elliptical mouth. The reservoir bottle 6 is sealed by a plastics or foil cap 6', and the act of inserting the inverted reservoir bottle 6 into the housing 2 causes the cap 6' to break, by virtue of the shape of the inlet portion 9 of the conduit 8 so as to permit liquid from the reservoir bottle 6 to fall under gravity into the conduit 8.

The inlet portion 9 is provided with a projection in the form of a stud 9' which serves to retain the cap 6' in its open position. It will be appreciated that, in the absence of such a stud, the cap 6' could be forced, but the weight of the liquid remaining in the reservoir 10 bottle 6, to fall back into its original position, thereby preventing further liquid from being dispensed. As can be seen from Figures 2, 3 and 4, the stud 9' extends parallel to the axis of the inlet portion 9 and adjoins the inlet portion 9 at its shortest point. The stud 9' is formed integrally with the inlet portion 9. Thus, the extreme end of the inlet portion 9 bears against one side of the cap 6' of the reservoir bottle 6, causing it to break 15 and to pivot about an axis at the opposite side. On fully inserting the inlet portion 9 into the reservoir bottle 6, the stud 9' is caused to bear against the outer face of the cap 6' so as to prevent it from falling back into its closed position. The stud 9' extends along the complete length of the cylindrical inlet portion 9, for ease of manufacturing, e.g. by moulding.

20

The conduit 8 further comprises an outlet portion 10 in the form of a cylinder which bears against the porous pad 7. The cross-sectional area of the outlet portion 10 is less than that of the inlet portion 9, and this helps to prevent, or at least minimise the amount of, flushing water entering the reservoir bottle 6.

25

As can be seen from Figures 4(a) to 4(c), the cylinder of the outlet portion 10 can be D-shaped, circular or rectangular in cross-section, and the outlet portion 10 is partially or totally surrounded by a cylindrical barrier wall 10' of rectangular cross-section, which further acts to prevent ingress of flushing water.

30

In the arrangements shown in Figures 4(a) and 4(b), one of the two long sides of the rectangular cross-section of the barrier wall 10' coincides with a diameter of the circular cross-section of the inlet portion 8 when viewed vertically. This arrangement enables

the position of the porous pad 7 to be adjusted so as to ensure that a portion is always in the stream of the flushing water for a wide range of different lavatory bowls, whilst ensuring that the outlet portion 10 of the conduit 8 is effectively closed by the porous pad 7.

5

- In the arrangement shown in Figure 4(c), the centre of the rectangular cross-section of the outlet portion 10 coincides with the centre of the circular cross-section of the inlet portion 9 when viewed vertically. This arrangement is particularly suitable for use in conjunction with the embodiments of the wicking device described below with reference to Figures 13(a) and 13(b) or Figure 14 or a wicking device in the form of a plate having elongate channels therein.

In the arrangements shown in Figures 4(a) and 4(b), the inlet and outlet portions 9, 10 of the conduit 8 are separated by a membrane provided with a small circular aperture 10".

15

- The manner in which the position of the porous pad 7 can be adjusted by a user is illustrated in Figure 7. The porous pad 7 is provided with two elongate guide slots 11 which are engaged by two corresponding spring fingers 12 in the housing 2. The guide slots 11 serve to define the two extreme positions of the range of possible positions of the porous pad 7 within the housing 2.

- In order to allow air to replace liquid dispensed from the reservoir bottle 6, a series of small vent holes 13, typically 1.3 mm (50/1000 inch) in diameter, are formed in the porous pad 7 and arranged such that, in whatever position of the porous pad 7 within the range defined by the guide slots 11, there is always at least one vent hole 13 communicating air from beneath the porous pad 7 to the mouth of the reservoir bottle 6 via the conduit 8.

- The housing 2 is also formed with a comb-shaped series of apertures 14 at the bottom of the front side which allow the flushing water to drain away from above the porous pad 7.

The housing 2 is additionally provided with a number of horizontal rib-like projections 15 for engaging a corresponding horizontal groove (not shown) at the top of the reservoir bottle 6 so as to retain the reservoir bottle 6 in the operative position within the housing 2 once it has been inserted by a user.

- 5
- The functioning of the adjustable porous pad 7 will now be described with reference to Figures 8 and 9. Figure 8 illustrates the configuration of the dispensing device 1 when used with a lavatory with an open rim. With the dispensing device 1 suspended from the rim 16 of such a lavatory, it can be seen that the stream of flushing water, indicated 10 by the thick arrow, passes through the porous pad 7 when the porous pad 7 is in the fully-inserted position. However, when used with a lavatory of the boxed-rim configuration, as shown in Figure 9, a longer porous pad is provided. However, it can be seen that, even if this longer porous pad 7 were to remain in its fully-inserted position, the stream of flushing water emanating from the boxed rim 17 would not 15 contact the porous pad 7, and the device would not therefore function optimally. With such a boxed-rim configuration, a longer porous pad is provided, and this is withdrawn to a fully-extended position, as shown in Figure 9, so as to expose a portion thereof to the stream of flushing water, indicated by the thick arrow, while ensuring that the outlet portion 10 of the conduit 8 is still closed by the inner portion of the porous pad 7. As 20 described above, this is ensured by virtue of the guide slots 11 within the porous pad 7 abutting the spring fingers 12 within the housing 2.

The adjustability of the porous pad is of particular advantage when used either with open rim lavatories or with boxed rim lavatories, since there is a large range of 25 geometries within each type, as illustrated in Figure 10, which illustrates examples of the various lavatory rim configurations for different countries, and thereby indicating the utility of being able to select the porous pad and also to adjust its position. More specifically, the drawing illustrates the distance between the position of the housing of the liquid dispenser and the stream of flushing water. The cross-hatched area indicates 30 the limited range distances (up to 16 mm (0.625 inch)) for which prior-art liquid dispensers would be suitable, and the single-hatched area indicates the range of distances (up to 22 mm (0.875 inch)) for a single size of porous pad according to the preferred embodiment of the invention. With larger pad sizes, the distance of utility can

be extended indefinitely, but in practice, the maximum distance required is about 48 mm (1.9 inches). The bars indicate the range of distances found in different countries, as follows: (a) Australia; (b) United Kingdom; (c) Malaysia; (d) South Africa; (e) France; (f) Italy; (g) Spain; (h) Japan; (i) Thailand; (j) Brazil, Argentina and Mexico; (k) 5 Korea; (l) Philippines; (m) and (n) U.S.A. The vertical line intersecting the bars indicates an approximate dividing line between lavatories of the open-rim construction (to the left of the line) and those of the boxed-rim construction (to the right of the line).

In an alternative arrangement, shown in Figure 11, the housing 2 is provided with a 10 spillage tray 18 incorporating a vertical vent channel 19 positioned in register with a vent hole 13 in the porous pad 7. This serves the function of collecting any excess liquid while still enabling venting of the reservoir bottle 6.

A first alternative structure of the wicking device is shown in a perspective view in 15 Figure 12(a) and in a cross-sectional view in Figure 12(b). In this embodiment, the wicking device is in the form of a plate 20 having the same over-all shape as that illustrated in Figure 7, with the elongate guide slots 11 providing adjustability of position of the plate 20 to accommodate different lavatory geometries. However, the plate 20 is not porous but solid apart from a number of raised through-holes 21 formed 20 therein. The holes serve to permit the liquid, when diluted with the flushing water to pass through, in the direction of the clear arrow, and also permit venting of the reservoir bottle 6, as shown by the solid arrow. The holes are sufficiently small to prevent the undiluted liquid from passing through.

25 A second alternative structure of the wicking device is shown in a perspective view in Figure 13(a) and in a cross-sectional view in Figure 13(b). As with the first alternative structure described above with reference to Figures 12(a) and (b), the wicking device is in the form of a plate 22 having the same over-all shape as that illustrated in Figure 7, with the elongate guide slots 11 providing adjustability of position of the plate 22 to 30 accommodate different lavatory geometries. In this embodiment, the plate 22 is again non-porous but solid apart from a number of elongate slots 23 formed therein in a generally parallel but splayed configuration. The slots 23 permit the liquid, when diluted with the flushing water to pass through, in the direction of the clear arrow, and

also permit venting of the reservoir bottle 6, as shown by the solid arrow. The slots 23 are sufficiently small to prevent the undiluted liquid from passing through.

- Third and fourth alternative structures of the wicking device are shown in perspective views in Figures 14(a) and (b) respectively. As with the second alternative structure described above with reference to Figures 13(a) and (b), the wicking device is in the form of a non-porous plate 24, 24' having the same over-all shape as that illustrated in Figure 7, with the elongate guide slots 11 providing adjustability of position of the plate 24, 24' to accommodate different lavatory geometries and having a number of elongate slots 25, 25' formed therein. In the arrangement shown in Figure 14(a), the slots 25 are arranged in a parallel fashion and not splayed. Furthermore, a recess 26 is formed within the plate 24 to accommodate the top of the inverted reservoir bottle 6. In the arrangement shown in Figure 14(b), the slots 25' are arranged in a splayed fashion which enables the liquid to be conveyed from the reservoir in divergent paths. In this arrangement, a T-shaped recess 26' is formed in the plate, but there are no capillary channels in this recess. The recess 26' is formed such that the leg of the "T" is slightly shallower than the bar of the "T", as can be seen from Figure 14(b). The leg serves as a vent for air.
- A fifth alternative structure of the wicking device is shown in a perspective view in Figure 15(a) and in a cross-sectional view in Figure 15(b). As with the second, third and fourth alternative structures described above with reference to Figures 13(a) and (b) and Figures 14(a) and (b), the wicking device is in the form of a non-porous plate 27 having the same over-all shape as that illustrated in Figure 7 and having a number of elongate slots 28 formed therein. In this embodiment, the slots 28 are arranged generally in a parallel fashion but form a tapered geometry in the region of the mouth of the reservoir bottle 6. The plate 27 comprises a venting post 29 which mates with the mouth of the reservoir bottle 6 in use so as to provide a vent channel. The venting post 29 is provided with a number of radial fins 30 which define conduits for the liquid between the reservoir bottle 6 and the plate 27. As with Figures 12(b) and 13(b), the flow of liquid and the venting are indicated by the clear and solid arrows respectively. It will be appreciated that, with this embodiment, a separate plate 27 will need to be provided for each different geometry of lavatory rim.

In the preferred embodiment, and in the alternative embodiments described above, the venting has been achieved through the wicking device. However, the invention extends to arrangements wherein the venting is achieved in a more direct fashion by providing a
5 venting aperture in the reservoir bottle itself, in addition to the mouth of the reservoir bottle through which the liquid is dispensed.

In a first alternative venting arrangement, as shown in a perspective view in Figure 16(a) and in a cross-sectional view in Figure 16(b), the top face of the reservoir bottle
10 31 is provided with a one-way valve in the form of a duck-bill valve 32. This permits air to pass into the reservoir bottle 31 when the pressure difference between the inside of the bottle and the outside reaches a predetermined level.

In a second alternative venting arrangement, as shown in a perspective view in Figure 15 17(a) and in cross-sectional views in Figures 17(b) and (c), the top face of the reservoir bottle 33 is provided with a plug 34 which seals an aperture 35 within the reservoir bottle 33, and the housing 36 is provided with a corresponding pin 37 positioned such that, when a user inserts the reservoir bottle 33 into the housing 36, in the direction indicated in Figure 17(b) by the clear arrow, the pin 37 bears on the plug 34, in the
20 direction indicated by the solid arrow in Figure 17(c), and releases it into the reservoir bottle 33, as shown in Figure 17(c). The pin 37 is sized in relation to the aperture 35 so as to provide a vent channel between the pin 37 and the aperture 35.

In a third alternative venting arrangement, as shown in a perspective view in Figure 25 18(a) and in cross-sectional views in Figures 18(b) and (c), the top face of the reservoir bottle 38 is provided with a breakable seal 39 which covers an aperture 40 within the reservoir bottle 38, and the housing 41 is provided with a corresponding tube member 42 positioned and dimensioned such that, when a user inserts the reservoir bottle 38 into the housing 41, in the direction indicated by the clear arrow in Figure 18(b), the tube
30 member 42 bears on the seal 39, in the direction indicated by the solid arrow in Figure 18(c), releases it into the reservoir bottle 38 and seals the aperture 40, as shown in Figure 18(c). A venting channel is thus provided along the bore of the tube member 42. The end of the tube member 42 is chamfered for ease of location within the aperture 40.

In a fourth alternative venting arrangement, as shown in a perspective view in Figure 19(a) and in a cross-sectional view in Figure 19(b), the top of the reservoir bottle 43 is provided with a venting aperture 44 distinct from, but proximate to, the mouth 45 of the reservoir bottle 43. Both the venting aperture 44 and the mouth 45 of the reservoir bottle 42 are sealed prior to use with a breakable seal (not shown). The housing 46 is provided with a post 47 positioned and dimensioned such that, when a user inserts the reservoir bottle 43 into the housing 46, in the direction indicated by the clear arrow in Figure 19(a), the post 47 breaks the seal and is inserted in the venting aperture 44 seals the aperture 40, as shown in Figure 19(b). A venting channel is thus provided along the bore of the post 47.

In a fifth alternative venting arrangement, as shown in perspective views in Figures 20 (a) and (b), the top of the reservoir bottle 48 is provided with a venting hole 49 covered by a removable tab 50, which is arranged to be broken away from the reservoir bottle 48 by a user, by manipulation as indicated by the clear arrows in Figure 20(a), prior to inserting the reservoir bottle 48 in the housing 51, as shown in Figure 20(b). In a variant of this embodiment, as shown in a cross-sectional view in Figure 20(c), the housing 51 is provided with a ramp projection 52 which is positioned so as automatically to remove the tab 50 a user inserts the reservoir bottle 48 in the housing 51.

The invention has been described above in relation to preferred embodiments. However, many variations and modifications will be apparent to those skilled in the art, and the scope of the invention is defined solely by the claims appended hereto.

For example, although the wicking device in the preferred embodiments has been described as comprising a porous pad or a plate having circular or elongate apertures therethrough, the wicking device could alternatively comprise a plate having elongate channels therein, and the liquid would be dispensed from these channels by virtue of the flushing water displacing the liquid from the channels.

In addition, although the preferred embodiments concern arrangements for dispensing liquid from the rim of a lavatory, the invention could also be applied to arrangements for releasing an insecticide or an air freshener into the atmosphere.

CLAIMS:

1. A liquid-dispensing device comprising a liquid reservoir having a mouth and a closure member arranged, when in its closed position, to seal the mouth and which can be moved into an open position, in which liquid can be dispensed from the reservoir, the device further comprising opening means for causing the closure member to be so moved into said open position and means for retaining said closure member in its open position, wherein said closure member is substantially rigid and arranged to be pivoted between said open and closed positions about one side thereof.

2. A device as claimed in Claim 1, wherein the angle through which said closure member is moved between said open and closed positions is substantially 90 degrees.

3. A device as claimed in Claim 1 or Claim 2, wherein said opening means comprises a projection arranged to bear on the side of the closure member generally opposite to said one side.

4. A device as claimed in Claim 3, wherein said retaining means comprises a further projection arranged to bear on a face of the closure member when in its open position.

5. A device as claimed in Claim 4, wherein said closure member is substantially circular and said opening means and said retaining means are disposed at diametrically opposed positions in relation to the closure member.

6. A device as claimed in Claim 5, wherein said opening means and said retaining means are formed on a substantially circular obliquely truncated cylinder which is arranged to be inserted into the mouth of the reservoir to cause the closure member thereof to move into its open position.

7. A device as claimed in Claim 6, wherein said opening means comprises the end portion of the obliquely truncated cylinder.
8. A device as claimed in Claim 6 or Claim 7, wherein said retaining means comprises a projection from the cylinder.
9. A device as claimed in Claim 8, wherein said projection comprises a stud.
10. A device as claimed in and one of Claims 6 to 9, wherein the cylinder and the reservoir mouth are so dimensioned as to form a substantially liquid-tight seal when the cylinder is inserted in the reservoir mouth.
11. A device as claimed in any preceding claim, wherein the opening means and the retaining means form part of a housing for the reservoir.
12. A device as claimed in claim 11, wherein said housing comprises means for suspending the device such that, when the opening means and the retaining means are inserted in the reservoir mouth, the reservoir is supported in an inverted position with the mouth lowermost, such that the liquid can be dispensed from the reservoir.
13. A device as claimed in any preceding claim and arranged to be suspended from the rim of a lavatory.
14. A housing for a liquid reservoir having a mouth and a closure member arranged, when in its closed position, to seal the mouth and which can be moved into an open position, in which liquid can be dispensed from the reservoir, said housing comprising opening means for causing the closure member to be so moved into said open position and means for retaining said closure member in its open position, wherein said closure member is substantially rigid and arranged to be pivoted between said open and closed positions about one side thereof.



INVESTOR IN PEOPLE

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Claims searched: 1-14

Examiner: D. Haworth
Date of search: 15 May 2002

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): E1C (C36B)

Int Cl (Ed.7): E03D 9/03

Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

| Category | Identity of document and relevant passage | Relevant to claims |
|----------|---|--------------------|
| X | US 4722449 A (Dubach Werner) | 1-12 & 15 |
| X | WO 96/11850 A (Ingenius) | 1-4 and 6 |

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